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ESA CCI and C3S Soil Moisture Products: Generation and Quality Assurance

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Soil moisture Climate Data Records (CDRs) produced from active and passive microwave sensors are valuable for the study of the coupled water, energy and carbon cycles over land on a global scale. As part of the European Space Agency (ESA) Climate Change Initiative (CCI) a multi-decadal CDR is produced by systematically combining Level-2 datasets from separate missions. The combination of individual Level 2 datasets into a single product gives us the opportunity to profit from the advantages of individual missions, and to obtain homogenised CDRs with improved spatial and temporal coverage.

The most recent version of the ESA CCI product (v04.2) provides a PASSIVE dataset from radiometer-based products (1978 – 2016), an ACTIVE dataset from scatterometer-based products (1991 – 2016) and a COMBINED product (1978 – 2016). The latter blends data from Level 2 data after scaling them into a common climatology against GLDAS-Noah. From Version 3 onwards, a new blending approach was introduced which computes a weighted average of measurements from all sensors that are available at a certain point in time.

Currently, the operational production of these CDRs is being transferred to the EU Copernicus Climate Changes Services (C3S). In addition to the daily product provided within the ESA CCI, monthly aggregates as well dekadal (10-days) products are provided to the C3S Climate Data Store (CDS). The daily and dekadal products are produced in near-real-time, providing continuous updates to the CDR.

The accuracy of each data product is assessed through comparison to in-situ soil moisture observations using ground reference sites, particularly those included within the International Soil Moisture Network (ISMN). This assessment is undertaken each time a new ESA CCI version is generated, and the results compared are against previous products to assess the evolution of the product quality over time. The quality assessment also includes consideration of the stability of the product and a completeness / consistency check. The aim of these assessments is to ensure that the highest quality product is provided to the data users.

In this study, an overview of the product generation is presented as well as examples of how the data product has been used. The associated quality assurance requirements, assessment procedures and results will also be presented.

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